

304 could be driven independently by different channels on the amplifier, or together by the same channel, depending on the application needs.

[0053] Storage **1508** provides a relatively large amount of “permanent” data storage, using nonvolatile solid state memory (e.g., flash storage) and/or a kinetic nonvolatile storage device (e.g., rotating magnetic disk drive). Storage **1508** may include both local storage and storage space on a remote server. Storage **1508** may store data as well as software components that control and manage, at a higher level, the different functions of the device **1500**.

[0054] In addition to storage **1508**, there may be memory **1514**, also referred to as main memory or program memory, which provides relatively fast access to stored code and data that is being executed by the processor **1512**. Memory **1514** may include solid state random access memory (RAM), e.g., static RAM or dynamic RAM. There may be one or more processors, e.g., processor **1512**, that run or execute various software programs, modules, or sets of instructions (e.g., applications) that, while stored permanently in the storage **1508**, have been transferred to the memory **1514** for execution, to perform the various functions described above.

[0055] The device **1500** may include communications circuitry **1502**. Communications circuitry **902** may include components used for wired or wireless communications, such as two-way conversations and data transfers. For example, communications circuitry **1502** may include RF communications circuitry that is coupled to an antenna, so that the user of the device **1500** can place or receive a call through a wireless communications network. The RF communications circuitry may include a RF transceiver and a cellular baseband processor to enable the call through a cellular network. For example, communications circuitry **1502** may include Wi-Fi communications circuitry so that the user of the device **1500** may place or initiate a call using voice over Internet Protocol (VOIP) connection, transfer data through a wireless local area network.

[0056] The device may include a transducer **1518**. Transducer **1518** may be a speaker and/or a transducer assembly such as that described in reference to FIGS. **1-13**. Transducer **1518** may be an electric-to-acoustic transducer or sensor that converts an electrical signal input (e.g., an acoustic input) into a sound or vibration output. The circuitry of the speaker may be electrically connected to processor **1512** and power source **1510** to facilitate the speaker operations as previously discussed (e.g., diaphragm displacement, etc).

[0057] The device **1500** may further include a motion sensor **1504**, also referred to as an inertial sensor, that may be used to detect movement of the device **1500**, camera circuitry **1506** that implements the digital camera functionality of the device **1500**, and primary power source **1510**, such as a built in battery, as a primary power supply.

[0058] While certain aspects have been described and shown in the accompanying drawings, it is to be understood that such embodiments are merely illustrative of and not restrictive on the broad invention, and that the invention is not limited to the specific constructions and arrangements shown and described, since various other modifications may occur to those of ordinary skill in the art. The description is thus to be regarded as illustrative instead of limiting. In addition, to aid the Patent Office and any readers of any patent issued on this application in interpreting the claims appended hereto, applicants wish to note that they do not

intend any of the appended claims or claim elements to invoke 35 U.S.C. 112(f) unless the words “means for” or “step for” are explicitly used in the particular claim.

What is claimed is:

1. A transducer assembly comprising:

a magnet motor assembly comprising a first magnet plate and a second magnet plate arranged along an axis, a first support plate positioned between inward facing surfaces of the first magnet plate and the second magnet plate, a second support plate positioned along an outward facing surface of the first magnet plate to form a first magnetic gap between the first support plate and the second support plate, and a third support plate positioned along an outward facing surface of the second magnet plate to form a second magnetic gap between the first support plate and the third support plate;

a voice coil coupled to the magnet motor assembly, wherein the voice coil is positioned around the first support plate and within the first magnetic gap and the second magnetic gap; and

a piston coupled to the voice coil, wherein the piston is operable to vibrate in a direction parallel to the axis.

2. The transducer assembly of claim 1 wherein the first support plate, the second support plate and the third support plate extend beyond ends of the first magnet plate and the second magnet plate such that the first magnetic gap and the second magnetic gap are formed by surfaces of the first support plate and the third support plate and the ends of the first magnet plate and the second magnet plate.

3. The transducer assembly of claim 1 wherein the inward facing surfaces of the first magnet plate and the second magnet plate have a same magnetic pole, and a magnetic flux line across the first magnetic gap and the second magnetic gap is perpendicular to a winding height of the voice coil.

4. The transducer assembly of claim 1 wherein a length or a width of the first magnet plate and the second magnet plate is parallel to the axis.

5. The transducer assembly of claim 1 wherein the magnet motor assembly is a first magnet motor assembly, the piston is a first piston and the voice coil is a first voice coil, the transducer assembly further comprising:

a second magnet motor assembly that shares the third support plate positioned along the outward facing surface of the second magnet plate with the first magnet motor assembly, the second magnet motor assembly comprising a third magnet plate, a fourth magnet plate and a fourth support plate, the third magnet plate is positioned between the third support plate and the fourth support plate, and the fourth magnet plate is positioned along a side of the fourth support plate opposite the third magnet plate; and

a second piston and a second voice coil arranged along an end of the third magnet plate and the fourth magnet plate.

6. The transducer assembly of claim 5 wherein the axis is a first axis, and the second piston vibrates along a second axis that is at an angle to the first axis.

7. The transducer assembly of claim 1 wherein the piston and the voice coil comprise a first piston and a first voice coil, and the transducer assembly further comprises a second piston and a second voice coil positioned at an end of the